

Title: Magnetotail reconnection and flux circulation: Jupiter and Saturn compared

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Abstract:

The Jovian magnetosphere has been visited by eight spacecraft, and the magnetometer data have been used to identify dozens of plasmoids and ~250 field dipolarizations associated with magnetic reconnection in the tail [e.g. Vogt et al., 2010]. Since the arrival of the Cassini spacecraft at Saturn in 2004, the magnetometer instrument has also been used to identify reconnection signatures. The deepest magnetotail orbits were in 2006, and during this time 34 signatures of plasmoids were identified.

In this study we compare the statistical properties of plasmoids at Jupiter and Saturn such as duration, size, location, and recurrence period. Such parameters can be influenced by many factors, including the different Dungey cycle timescales and cross-magnetospheric potential drops at the two planets. We present superposed epoch analyses of plasmoids at the two planets to determine their average properties and to infer their role in the reconfiguration of the nightside of the magnetosphere. We examine the contributions of plasmoids to the magnetic flux transfer cycle at both planets.

At Jupiter, there is evidence of an extended interval after reconnection where the field remains northward (analogous to the terrestrial post-plasmoid plasma sheet). At Saturn we see a similar feature, and calculate the amount of flux closed on average in reconnection events, leading us to an estimation of the recurrence rate of plasmoid release.